

### **REMARKS**

Claims 1-11 are pending in the application. Claims 1-11 have been cancelled by this amendment and new claims 12-23 have been added to the application. Therefore, claims 12-23 are at issue.

New claims 12-23 are fully supported by original claims 1-11, which serve as support for new claims 12-23.

Applicants also submit a substitute specification concurrently with this amendment. The specification has been re-translated to eliminate numerous translation errors in the English-language specification. Applicants submit both a marked-up copy of the originally filed English-language translation of the specification, and a clean copy of the substitute English translation of the specification. No new matter has been added to the specification.

Claims 1-10 stand objected to because of a number of formalities noted by the examiner. In view of the cancellation of claims 1-10, and the presentation of new claims 12-22, it is submitted that the objections to the claims have been overcome and should be withdrawn.

Claims 1-11 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. In view of the cancellation of claims 1-11, and the rewriting of the claims as new claims 12-23, it is submitted that each basis of the examiner's rejection has been addressed and overcome. Accordingly, it is submitted that the rejection of the claims as being indefinite under 35 U.S.C. §112, second paragraph, should be withdrawn.

Claims 1-3 and 11 stand rejected under 35 U.S.C. §102(e) as being anticipated by Goodell et al. U.S. Patent Publication No. 2003/0186036 ('036 publication). Claims 4-9 stand rejected under 35 U.S.C. §103 as being obvious over the '036 publication. Claim 10 stands rejected under 35 U.S.C. §103 as being obvious over the '036 patent in view of Nimz et al. U.S. Patent No. 5,074,960 ('960 patent). Applicants traverse these rejections.

It is axiomatic that “[A] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). A determination that a claim is anticipated under 35 USC §102 involves two analytical steps. First, the Patent Office must interpret the claim language, where necessary, to ascertain its meaning and scope. In interpreting the claim language, the Patent Office is permitted to attribute to the claims only their broadest *reasonable* meaning as understood by persons having ordinary skill in the art, considered in view of the entire disclosure of the specification. *See In re Buszard*, 504 F.3d 1364 (Fed. Cir. 2007) (reversing a Patent Office decision that applied an unreasonably broad interpretation to a claim); *see also, In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). Second, the Patent Office must compare the construed claim to a single prior art reference and set forth factual findings that “each and every limitation is found either expressly or inherently [disclosed] in [that] single prior art reference.” *Celeritas Techs. Ltd. V. Rockwell Int’l Corp.*, 150 F.3d 1354, 1360 (Fed. Cir. 1998). Additionally, “[t]he identical invention must be shown in as complete detail as is contained in the patent claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989).

The '036 publication discloses a method of oxidizing organic compounds using hydroxyl radicals, wherein the active oxygen, i.e., hydroxyl radical, is produced by Fenton reagent ( $\text{H}_2\text{O}_2 + \text{Fe}^{2+}$  or  $\text{H}_2\text{O}_2 + \text{Fe}^{2+} + \text{Cu}^{2+}$ ) and a redox cycling chelator. The hydroxyl radical is used to oxidize organic compounds, such as linocellulose, organic waste, dyes, and linocellulose to prepare an adhesive.

As recited in the present claims, the active oxygen used includes *both* active A (mainly hydrogen peroxide radical) *and* active B (mainly superoxide anion radical) produced by  $\text{O}_2$ ,  $\text{H}_2\text{O}_2$ ,  $\text{O}_3$  etc. under specific conditions (see claims 15-22, for example). The two types of active oxygen radicals selectively oxidize linocellulose in wood material and non-wood material, *without* oxidizing cellulose in the plant, to produce pulp (cellulose).

It is well known in the art that Fenton reagent only produces hydroxyl radical ( $\text{HO}\cdot$ ), which has *no* selectivity to oxidation of organic material. Hydroxyl radical is a strong oxidizer, and can oxidize organic material into  $\text{CO}_2$  and  $\text{H}_2\text{O}$  (i.e., mineralization), which is

commonly done in treating industrial waste water (such as dye waste water and chemical waste water).

The '036 publication merely discloses using hydroxyl radical for oxidizing cellulose board by attacking benzene rings of linocellulose and oxidizing and cracking benzene rings. However, hydrogen peroxide radical  $\text{HOO}\cdot$ , as claimed, is not electrophilic, as claimed, and thus does not attack cellulose. Hydrogen peroxide radical  $\text{HOO}\cdot$  selectively oxidizes the  $\pi$  bonds in benzene rings of linocellulose, thereby degrading linocellulose into smaller molecular species having different molecular weights. Some of these species are soluble into water and are filtered off to obtain cellulose (pulp). In contrast to the '036 publication, the present claims use hydrogen peroxide radical  $\text{HOO}\cdot$  to selectively degrade benzene rings, thereby obtaining cellulose. This claimed new pulping method produces paper pulp without waste liquid having high concentrations, and high saline, such as "black liquor" or "red liquor".

Because a difference exists between the '036 publication disclosure and the present claims, it is submitted that the '036 publication cannot anticipate claims 12-14 and 23, and that the rejection should be withdrawn. It is further submitted that the differences between claims 12-21 and 23 and the '036 publication are non-obvious differences.

In order to establish a *prima facie* case of obviousness, the Patent Office must identify each and every element of the claims in the prior art. Second, it must show that the proposed modification of the prior art would have had a reasonable expectation of success, determined at the time the invention was made. Third, it must provide a reason why the person of ordinary skill in the art would have combined the elements in the way claimed.

Applicants submit that a *prima facie* case of obviousness has not been established at least for the reason that the '036 publication fails to teach or suggest *every* element of the claims. In particular, the '036 publication merely discloses the use of the non-selective Fenton reagent to oxidize organic compounds. The '036 publication *fails* to teach or suggest the use of active oxygen A *and* active oxygen B, as recited in independent claim 12.

The '036 publication further provides no incentive or apparent reason for a person skilled in the art to substitute active oxygen A and active oxygen B for the disclosed Fenton reagent. In addition, the '036 publication is not directed to the preparation of a pulp, but to degrading organic compounds, activating lignocellulosic material for binding, and producing adhesives. Further, the present invention provides unexpected results with respect to providing a zero-discharge pulping process that could not have been predicted from the '036 publication.

With respect to claim 10 (now claim 22), the '960 patent fails to overcome the deficiencies of the '036 publication. The '960 patent is directed to a method of removing lignin from a lignocellulosic material, wherein the pulp can be produced according to the acetosolve process. Ozone is used to refine the lignocellulosic materials. However, the '960 patent fails to teach or suggest preparing a pulp by treating a raw material with an active oxygen A and an active oxygen B, as claimed.

New claims 22 recites a preferred embodiment of the present invention, and applicants do not rely solely upon the features recited in claim 22 for patentability, but rather rely upon the features recited in claim 22 *and* in independent claim 12 from which it depends. Accordingly, it is submitted that claim 22 is patentable over a combination of the '036 publication and the '960 patent for the same reasons claim 12 is patentable over this combination of references.

In summary, the '036 publication merely discloses the use of Fenton Reagent to produce hydroxyl radicals to oxidize linocellulose, thereby producing oxidized linocellulose for preparing adhesives. Contrary to the '036 publication, and as claimed, hydrogen peroxide radical  $\text{HOO}\cdot$  and superoxide anion radical is produced under specific conditions to oxidize both lignin and conjugated color-forming groups in wood material and non-wood material, thereby producing pulp having a high degree of whiteness, and mainly comprised of cellulose.

It is submitted therefor that new claims 12-23 are patentable over the '036 patent, alone or in combination with the '960 patent, under 35 U.S.C. §103, and that the rejections should be withdrawn.

It is further submitted that claims 12-23 are in a form and condition for allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

By 

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